

Serial No. 10/827499

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Dr. Heinrich Friederich

Examiner:

David C. Reese

Serial No.: 10/827499

Group Art Unit: 3677

Filed: April 19, 2004

Docket No.: 00635.0371-US-01

Title: Screw Element With A Spring Element Formed Thereon

COMMUNICATION REGARDING DECLARATION

MAIL STOP AF

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Dear Sir:

Further in response to the Office Action mailed 24 October 2006, Applicant is attaching the Declaration of Heinrich Friederich under Rule 1.132 for the Examiner's review.

Respectfully submitted,
Altera Law Group, LLC
Customer No. 22865

Date:

30 April 2007

By: /Michael Lasky/

Michael B. Lasky
Reg. No. 29,555
MBL/jsa

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DECLARATION OF HEINRICH FRIEDERICH UNDER RULE 1.132

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

I, Dr. Heinrich Friederich, do hereby declare and say that:

1. I am one of the named inventors in Application Serial No. 10/827,499 entitled "Screw element with a spring element formed thereon" filed with the United States Patent and Trademark Office. I am familiar with the subject matter of Application Serial No. 10/827,499. I am also familiar with and understand the contents of Laid Open European Patent Application EP 0 989 311, U.S. Patent No. 4,193,434 to Wagner and US 6,302,629 to Hsiao and the language of pending claims 12 and 14.
2. I read and understand the contents of this declaration and documents described above.
3. I was employed by EJOT Verbindungstechnik GmbH & Co KG from 1995 to 2006. From 1 July 2004 to 30 September 2006 I was Head of Research, Development and Materials Science.
4. Since 1 October 2006 I am working as full professor at the University of Applied Science Glessen-Friedberg, Germany. Beside this I am working as a consultant for EJOT.
5. I have a diploma degree in mechanical engineering from Technical University Darmstadt. I further have a doctoral degree in mechanical engineering from Technical University Darmstadt. I worked as a scientist in material research at the Institute for Materials Science of Technical University Darmstadt from 1988-1994. During this activity my main focus was research in the metallurgic field. During this time I worked as an expert for the "Materialprüfungsanstalt Darmstadt" (Institution for Material Inspection).
6. I have worked in the field of metallurgy, including experience in the design of screws, screw heads and anti-loosening means for about 17 years. I have been a member of "Deutscher Schraubenverband" (German Association for Screws) for about 10 years where I have the position of Head of the Section for Joint Research since 2005. I am a co-worker of "Deutsches Institut für Normung (DIN)" (German Institute for Standardization) since 2005. I am Head of the national/international group for standardization in the section ISO/TC2/SC1/WG3 "thread forming screws".

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7. Based on my qualifications, some of which are described above, I am a person of skill in the art for the subject matter of Application Serial No. 10/827,499.
8. I participated in the interview in US patent office on 10 April 2007 wherein the following points were discussed.
9. Research and investigation which led to the invention claimed in US patent application 10/827,499 were motivated and initiated following fatal failure of some specific prior art screw elements having separate spring washers which were employed to secure an electronic circuit board in automotive industry.
10. Investigations conducted at EJOT revealed that the reasons which led to this failure was cyclic loading of the screws leading to cracks and subsequent breakage of the spring washers due to hydrogen retarded embrittlement.
11. As usually at that time, the spring washers were formed from a hard material and underwent further hardening. A high hardness like e.g. above 480HV1 (max 600HV1), in particular harder than the screw element which typically should have a hardness lower than 380HV1 (strength class 10.9) is required to ensure elastic deformation of the washers in use and to prevent plastic deformation. Prevention of plastic deformation was thought to be essential to the properties of a spring washer.
12. In the course of our investigations we found out that a spring element will show elastic and thus reversible deformation even if it underwent plastic deformation in the course of tightening the screw connection.
13. We thus investigated behaviour of spring elements with a lower hardness than used in the prior art. Such spring elements surprisingly showed sufficient elastic deformation to prevent pre-stressing effect of the screw connection being lost in use. Further such spring elements having a lower hardness were resistant to fatal failure due to hydrogen retarded embrittlement.
14. We consequently developed a screw element having a spring washer formed thereon in one piece and having a lower hardness than the screw element.
15. It is my opinion that a skilled person will not think of lowering the hardness of the spring element below that of the screw element since up to the time the invention was made the spring element was supposed to have a high hardness to ensure elastic deformation only and to prevent plastic deformation. Plastic deformation was thought to be detrimental to the anti-loosening effect of the spring washer.
16. We further developed an embodiment having projections formed at the underside of the spring element to scratch off a layer on the counterpart and to thus ensure electric contact between the screw and the counterpart.
17. It is my opinion that a skilled person will not adopt the teaching of the projections shown in US 6,302,629 to Hsiao without further adopting the rigid ring shown in this reference because the skilled person is aware that the projections will only dig into the counterface as required by the configuration of Hsiao when formed onto a rigid ring. A skilled person will thus not adapt such projections to be formed onto a spring element.
18. Further, it is my opinion that a skilled person will not think of combining projections as shown in US 6,302,629 to Hsiao with a spring element having a hardness

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lower than the screw element. The anti-loosening effect provided by the projections shown in Hsiao requires a significant dig-in action of the projections. Such deep digging-in cannot be provided if the projections are formed on a spring element with a low hardness.

19. A first reason for this is that plastic deformation of the spring element will prevent deep digging-in.
20. A second reason for this is that the projections will necessarily have the same low hardness like the spring element and will thus become blunt after a small angle of rotation which will prevent further digging-in.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patents issuing thereon.

Signed: Date: 30/04/2007